

# Work Order ID 67866

Friday, April 01, 2011 1:52:26 PM



Page 1

Item ID: D212-664-101

Accept



Setup Start



Revision ID:

Stop



Item Name: Crosstube Fwd

Start Date: 4/1/2011 Start Qty: 1.00

Required Date: 4/8/2011 Req'd Qty: 1.00



Cust Item ID:

Customer:

Reference:

Approvals: Process Plan: *CL*

Date: 11/04/01 Tooling:

Date:

Run Start



QC:

Date: SPC (Y/N):

Date:

Stop



Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

Draw Nbr

Revision Nbr

D212-664-141

Rev D

100

0.00



DOCUMENT CONTROL

DC

Memo

0.00

Document Control

Photocopy bluefile and create labels as per PPP D212-664-101

*CHG003*  
*CHG004*

*S. Loefer*

*PER ECN 11-549*

110

0.00



Pick Kit

Packaging

Packaging

Memo

0.00

Packaging

120

0.00



BENDING MACHINE - CROSSTUBES

CNC Bend 2

Memo

0.00

CNC Alpha 160 Bender

Bend tube as per Dwg D212-664-141 using CNC bender program 212-fw and Folio D212-664-101

*DP*

*11-4-5*

*DP*

*11-4-5*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

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Customer:

Reference:

Run Start



Approvals: Process Plan:

Date:

Tooling:

Date:

Stop



QC:

Date:

SPC (Y/N):

Date:

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

130

QC15- Crosstube Dimensional Check

0.00



QC

Memo

0.00

Quality Control

140

0.00



Crosstubes

Crosstubes

Memo

0.00

Crosstubes

1-Drill pilot holes in tube as per Dwg D212-664-141 using drill Jig DT8548 & DT8549, using drill table DT8577, set-up towers in hole #7 as per QSI 10

2-Ream hole to finish size in tube as per Dwg D212-664-141 using drill Jig DT8548 & DT8549. Check dimensions between holes, both sides on both cuffs, to ensure alignment with saddle holes.

3-Scribe part # and batch # using vibrating stylus as per Dwg D212-664-141

4-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D212-664-141

SAD  
11-04-06

SAD  
11-04-06

①

②

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
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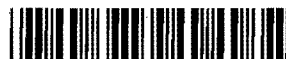
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Customer:

Reference:

Run Start



Approvals: Process Plan:

Date:

Tooling:

Date:

Stop



QC:

Date:

SPC (Y/N):

Date:

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
---------	--------	-----------	------------	------------	---------------	-------------

150

Crosstubes Chemical Conversion

0.00



HandFXtube

Memo

0.00

Hand Finishing Crosstubes

Chemical Conversion Coat within 24 hours of bending and drilling

SAD 11-04-11

160

QC5- Inspect part completeness to step on W/O

0.00



QC

Memo

0.00

Quality Control

170

Outsource process - NDT per QSI038 4.1

0.00



Outsource2

Memo

0.00

Outsource process - NDT

Liquid Penetrant Inspection as per QSI 038  
Issue P/O: 13857  
LPI as per ASTM 1417 Level 2  
Attach copy of NDT results to work order

CXL 4/04/11 ①

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Customer:

Reference:

Run Start



Approvals: Process Plan:

Date:

Tooling:

Date:

Stop



QC:

Date:

SPC (Y/N):

Date:

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

180



Packaging

Receive &amp; Inspect for Damage &amp; Mat'l Certs

0.00

Packaging

Memo

0.00

Packaging

Ensure copy of NDT results attached to work order.

*4/4/11 3 (1)*

190



QC

Quality Control

QC5- Inspect part completeness to step on W/O

0.00

Memo

0.00

Inspect for damage &amp; ensure results are as per Dwg D212-664-141

*25 11-04-14*

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Cust Item ID:

Required Date: 4/8/2011 Req'd Qty: 1.00



Customer:

Reference:

Run Start



Approvals: Process Plan:

Date:

Tooling:

Date:

Stop



QC:

Date:

SPC (Y/N):

Date:

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
---------	--------	-----------	------------	------------	---------------	-------------

200

Spray Painting per QSI005 4.2

0.00



SprayPaint

SprayPaint

Memo

0.00

Spray Painting

1-Prime inside and outside crosstube as per QSI 005 4.2  
2-Paint outside crosstube with White Imron as per QSI 005 4.2

PRIME:

Start Time: \_\_\_\_\_

Finish Time: \_\_\_\_\_

11-04-14

PAINT:

Start Time: \_\_\_\_\_

Finish Time: \_\_\_\_\_

11-04-15

BT 11-04-15



210

QC14- Inspect Spray Paint

0.00



QC

Quality Control

Memo

0.00

Then, Wrap in plastic bag to protect from scratches

ml 11/04/16 (J)

**Dart Aerospace Ltd**

W/O: 67866		WORK ORDER CHANGES						
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector	
11-04-14	200	prime entire outside surface using tempo epoxy primer clean 5 coat inside center strip 2" wide staying 2" away from cuff allow to dry	BE	11-04-15	1	11.04.15 GNCAR	ml/ml 11/04/15	
		mask off 2" strip 2" away from cuff scuff exposed primer + paint im on white	BE	11-04-15	1	11.04.15 GNCAR	ml/ml 11/04/16	

Part No: D212-664-101 PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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Revision ID:

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Item Name: Crosstube Fwd

Start Date: 4/1/2011 Start Qty: 1.00

Required Date: 4/8/2011 Req'd Qty: 1.00

Cust Item ID:

Customer:

Reference:

Run Start

Approvals:

Process Plan:

Date:

Tooling:

Date:

Stop

QC:

Date:

SPC (Y/N):

Date:

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool #

Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

220

0.00



Crosstubes

Crosstubes

Memo

0.00

1- Lightly scuff the bonded area using a 320 grit sand paper and clean the area with 41058 wash 'n' wipe  
2-Install supports with magnobond as per QSL015. Adhere for 12 Hrs  
A/R 6398 Magnobond Batch: 116677  
3- Torque bolts as per dwg

RET 11-04-17

(Pto)

230

0.00



QC

Quality Control

QC6- Inspect dimensions to drawing

Memo

0.00

11 04 18 (D)

240

0.00



Packaging

Packaging

Pick Kit

Memo

0.00

11/4/18 (L)

# Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector
11-04-18	220	use MS21920-24 clamps - 25 new more stock - 26 too long	BT	11-04-18	-1	11-04-18 04042	11/04/18

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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# Work Order ID 67866

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Revision ID:

Stop



Item Name: Crosstube Fwd

Start Date: 4/1/2011 Start Qty: 1.00



Cust Item ID:

Required Date: 4/8/2011 Req'd Qty: 1.00



Customer:

Reference:

Run Start



Approvals: Process Plan:

Date:

Tooling:

Date:

Stop



QC:

Date:

SPC (Y/N):

Date:

Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Tool ID

Tool #

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

250

QC4- 100% Inspect kits for completeness

0.00



0.00 *Subtotal*

*40*

QC

Memo

Quality Control

260

Packaging

0.00



0.00

Packaging

Memo

Packaging

Identify and pack for shipping as per PPP D212-664-101

*REV E*

*11/4/18*

270

QC21- Final Inspection - Work Order Release

0.00



0.00

QC

Memo

Quality Control

*11/4/18*

*mf*

*11-04-18*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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**NOTE:** Date & initial all entries

# Picklist Print

Friday, April 01, 2011 1:52:23 PM

Page 1

Work Order ID: 67866

Parent Item: D212-664-101

Parent Item Name: Crosstube Fwd



Start Date: 4/1/2011

Required Date: 4/8/2011

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:E 04.02.16 Reformat IKJ/DS  
IPP Rev:F 06-03-29 Remove Coments on Pick List JLM  
IPP Rev:G 07-04-30 As per Rev C JLM

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
---------------------------------	------------------------	---------------	-------------	---------------------	------------------	-----------------	--------------------	----------------	-------------	--------------	---------------	----------------	--------

D212-664-101TRN Manufactured No



Crosstube Turning Detail

Location 367864 Loc Qty

LG	4
67218	1
67219	1
67570	1
67571	1

Loc Code

① DP 11-A-5

D3595-063-450 Manufactured No



RUBBER CUSHION

230 Each 79.0000 4 4.210526



BT 11-04-16

Location Loc Qty

LG	66
67353	66
LG055	13
67067	13

Loc Code

x 4

MS21920-25 Purchased No



Clamp(per MIL-DTL-8783C)

220 Each 68.0000 4 4



Location Loc Qty

LG050	68
116264	18
117279	50

Loc Code

-24 as per P10 @ step 220 107441

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Page 2

Work Order ID: 67866

Parent Item: D212-664-101

Parent Item Name: Crosstube Fwd

Start Date: 4/1/2011

Required Date: 4/8/2011

Start Qty: 1.00

Required Qty: 1.00

D2893-1

Manufactured No

220

Each

15.0000

2

2



2.75 Support



BT 110416

## Location

## Loc Qty

## Loc Code

LG052

15

66698

15

Manufactured

No

240

Each

23.0000

1

1

D3428-1



Placard



x2

Handwritten signature

## Location

## Loc Qty

## Loc Code

ST053

23

66115

11

66961

12

Purchased

No

240

Each

100.0000

4

4

AN6-35A



BOLT



66115

Handwritten signature

## Location

## Loc Qty

## Loc Code

ST343

100

113422

30

115698

20

116528

50

Purchased

No

240

Each

15.0000

4

4

AN6-36A



Bolt



M113922

M117313

Handwritten signature

## Location

## Loc Qty

## Loc Code

ST343

15

117010

15

Friday, April 01, 2011 1:52:24 PM

Shop Packet Print

Page 2

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
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Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Parent Item Name: Crosstube Fwd



Start Date: 4/1/2011

Required Date: 4/8/2011

Start Qty: 1.00

Required Qty: 1.00

MS21042L6

Purchased

No

240

Each

138.0000

6

6



Nut



*[Handwritten signature]*

Location

Loc Qty

Loc Code

ST300

138

116373

38

116548

100

AN960JD616

NAS1149D0663J

Purchased

No

240

Each

0.0000

18

18



Washer



*116878*

*M116289 4/1/11*

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Shop Packet Print

Page 3

**Dart Aerospace Ltd**

W/O:		WORK ORDER CHANGES					
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Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

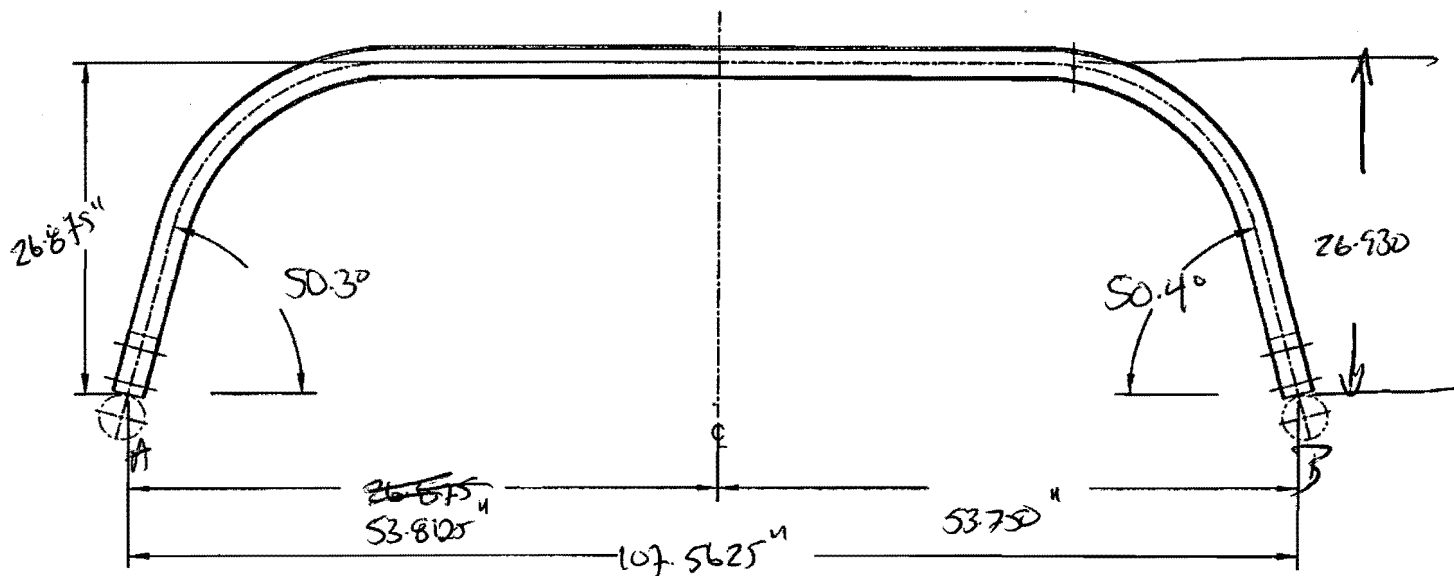
Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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<b>DART AEROSPACE LTD</b>		<b>Work Order:</b>	67866
<b>Description:</b> Crosstube High Fwd (205/212/412)		<b>Part Number:</b>	D212-664-101
<b>Inspection Dwg:</b> D212-664-141 <b>Rev:</b> D		<b>Page 1 of 1</b>	

Required Dimension	Min	Max
Height	26.79	27.05
1/2 Span	53.59	53.85
Angle	49	52
Total Span	107.18	107.7



Comments

QC15 Inspection	S
Date	11/01/05

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	07.05.31	Dimensions updated per Dwg Rev C	KJ/JM	
C	10.04.01	Dwg Rev updated	KJ	

$53.8125$   
 $53.7500$   
 $\hline$   
 $107.5625$



Item	Qty -141	Qty -141B	Part Number	Description
1	X		D212-664-141	CROSSTUBE ASSEMBLY (205/212/412 HIGH FWD)
2		X	D212-664-141B	CROSSTUBE ASSEMBLY (214 HIGH FWD)
3	1	1	D6005-128	CROSSTUBE
4	2	2	D2893-1	SUPPORT
5	4	4	D3595-063-450	RUBBER CUSHION
6	4	4	MS21920-25	CLAMP (OR MS21920-26)
7	A/R	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023, ADHESIVE (TEXTRON/BELL SPEC. 299-847-100, TYPE II, CLASS 2 ADHESIVE)

# **GENERAL NOTES:**

- MATERIAL: MANUFACTURED FROM D6005-128  
FINISHED LENGTH = 126.514±0.020
- FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: SCRIBE DART PART NUMBER "D212-664-XXX" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS
- WEIGHT: D212-664-141 = 33.6 lbs (PER IIN-D212-664)  
D212-664-141B = 33.6 lbs (PER IIN-D212-664)
- PART IS SYMMETRIC ABOUT CENTERLINE.
- RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- BEND PROGRESSIVELY WITH A MINIMUM OF 3 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- INSTALL D2893-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- INSTALL MS21920-25 CLAMPS (OR -26) WITH D3595-063-450 RUBBER CUSHIONS TO SECURE THE D2893-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

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WITHOUT NOTICE  
WORK ORDER  
NO. 67866

02/11/04/01

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2009-10-29

D	REFORMAT/REVISE GENERAL NOTES/PART LIST; REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS; ADD -141B (ZN B4-2, D4-2); REMOVED REF & ADD TOLERANCES (ZN B4-3, C6-3, C8-3 & B6-3); RELOCATED FLAG #6 PER PAR 08-046 (ZN A5-3); MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4	RF	09.09.30
C	REMOVE -851 ABRASION STRIP; ADD MAGNOBOND 6398, CUSHION, REVERSE CLAMPS	PH	07.03.08
B	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	PH	05.02.04
A	NEW ISSUE	PH	00.12.12
REV.	DESCRIPTION	BY	DATE
DESIGN	PH	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	PH	DRAWING NO.	REV. D
MFG. APPR.	PH	D212-664-141	SHEET 1 OF 4
APPROVED	PH	TITLE	SCALE
DE APPR.	PH	XTUBE ASS'Y (205/212/412 HI FWD)	NTS
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8 7 6 5 4 3 2 1

12 13 15  
D2893-1 SUPPORT  
MS21920-25 CLAMP, 2X  
D3595-063-450 RUBBER CUSHION, 2X  
2 PL

A4-2

A

14.00 (-141)  
OR 13.75 (-141B)

D

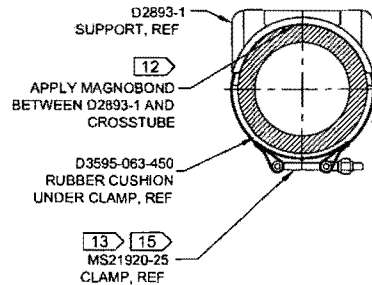
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CL  
SYM

D212-664-141/-141B  
ASSEMBLY DETAIL

D



SECTION A-A  
SCALE 4X

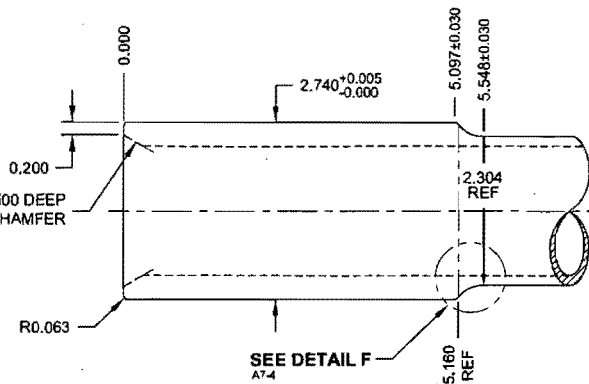
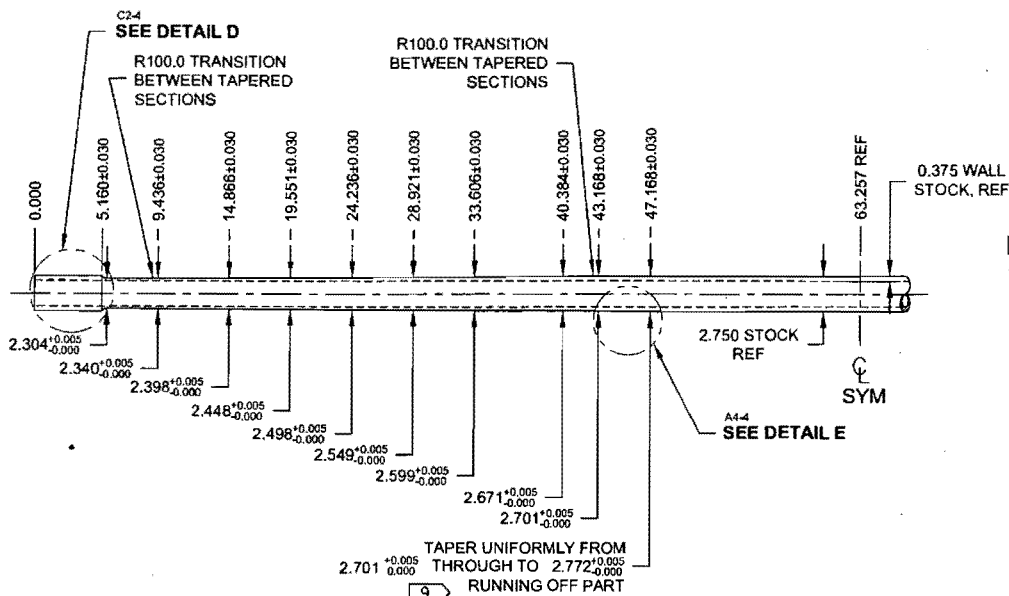
D5-2

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MFG. APPR.	10	D212-664-141	SHEET 2 OF 4
APPROVED	10	TITLE	SCALE
DE APPR.	10	XTUBE ASS'Y (205/212/412 HI FWD)	NTS
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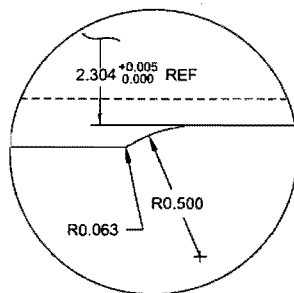




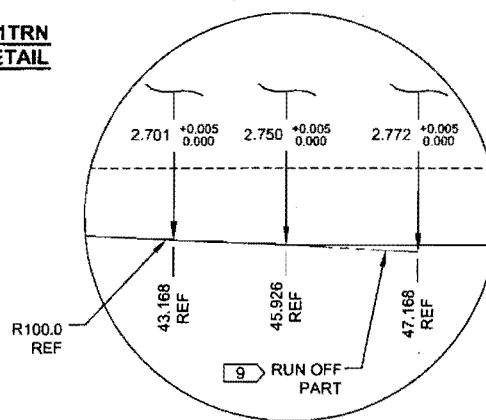
DETAIL D:  
 CROSSTUBE CUFF D8-4  
 SCALE 5X

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RELEASED  
 2009-10-29



DETAIL F:  
 CUFF TRANSITION C2.4  
 SCALE 10X



DETAIL E:  
 TAPER RUN-OFF C5.4  
 NOT TO SCALE

DESIGN	PH	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	JP	DRAWING NO.	REV. D
MFG. APPR.	NS	D212-664-141	SHEET 4 OF 4
APPROVED	AP	TITLE	SCALE
DE APPR.	TH	XTUBE ASS'Y (205/212/412 HI FWD)	NTS
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# HeathAir

INTERNATIONAL (1991) INC.

681 Ave. Lepine, Dorval, Québec H9P 1G3  
Tél.: 514 636-1000 • Fax: 514 636-0031

W.O. 44191

A.M.O. Number: 46/90

## NON-DESTRUCTIVE TESTING REPORT

### REGISTRATION / COMPONENT INFORMATION

REGISTRATION:

MODEL/TYPE:

SERIAL NUMBER:

TOTAL HR/LDG:

OPERATED BY:

BASED AT:

### INSPECTION REQUIREMENTS

Carry out FPI of (4) cross tubes (external surface) as per ASTM E-1417-05 and the Dart QSI 038, Section 4.1.1 (on file at client) - parts delivered to HeathAir.

Qty (2) P/N D212-664-101 S/N's B67866 and B67867.

Qty (1) P/N D206-667-207BL S/N B68089.

Qty (1) P/N D206-667-107BL S/N B68088.

Sales Order Ref.: 230626

Contact: Chantal Lavoie at 613-632-5200 for pick-up.

BT 11-04-14

☐ RADIOGRAPHY

☐ ULTRASONIC

☒ PENETRANT

☐ MAGNETIC PARTICLE

☐ EDDY CURRENT

### INSPECTION REPORT

Fluorescent penetrant inspection was performed in accordance with the above requirements on (4) cross tubes.

Note: A Level 3 penetrant was substituted for the requested Level 2 (3 is more sensitive)  
Ardrox 970P25E Batch #04B503.

(4) cross tubes inspected. (4) PASSED / (0) FAILED.

THE MAINTENANCE DESCRIBED ABOVE HAS BEEN PERFORMED IN ACCORDANCE WITH  
THE APPLICABLE STANDARDS OF AIRWORTHINESS

DATE April 13, 2011

INSPECTED BY: 

### CUSTOMER INFORMATION

CUSTOMER: Dart Aerospace

P.O. NUMBER

Chantal

ADDRESS:

CONTACT NAME:

LABOUR	@		\$
MATERIALS	@		
TRAVEL EXPENSES	@		GST
HOTEL EXPENSES	@		PST

INVOICE NO.

PO 13857

TOTAL \$

WHITE COPY - INSPECTION FILE • YELLOW COPY - CUSTOMER • PINK COPY - ACCOUNTANT



REFERENCE ONLY

## 5.0 PARTS LIST

## 5.1 HIGH GEAR CROSSTUBES

Item	-101	-201	-203	Part Number	Description
	X			D212-664-101	CROSSTUBE INSTALLATION, 204/205/210/212/214/412, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH FWD
		X		D212-664-201	CROSSTUBE INSTALLATION, 204/205/210/212/214, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH AFT
			X	D412-664-203	CROSSTUBE INSTALLATION, 412 HIGH AFT
1	1			D212-664-141	CROSSTUBE ASSEMBLY, 204/205/210/212/214/412, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH FWD
2		1		D212-664-241	CROSSTUBE ASSEMBLY, 204/205/210/212/214, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH AFT
3			1	D412-664-243	CROSSTUBE ASSEMBLY, 412 HIGH AFT
10	2			* D2893-1	SUPPORT
11	4			* D3595-063-450	RUBBER CUSHION
12	4			* MS21920-25	CLAMP (OR MS21042-26)
13	4			AN6-35A	BOLT
14	4			AN6-36A	BOLT
15	6			MS21042L6	NUT (OR MS21042-6)
16	18			AN960JD616	WASHER
20		2		* D2940-1	SUPPORT
21		4		* D3595-063-530	RUBBER CUSHION
22		4		* MS21920-28	CLAMP (OR MS21042-30)
23		4		AN6-40A	BOLT
24		2		AN6-41A	BOLT
25		6		MS21042L6	NUT (OR MS21042-6)
26		18		AN960JD616	WASHER
30			1	* D2896-1	SUPPORT
31			2	* D2856-600-1009	ABRASION STRIP
32			2	* D3595-063-570	RUBBER CUSHION
33			4	* MS21920-28	CLAMP
34			2	* MS21920-30	CLAMP (OR MS21042-32)
35			4	AN6-40A	BOLT
36			2	AN6-41A	BOLT
37			6	MS21042L6	NUT (OR MS21042-6)
38			18	AN960JD616	WASHER
39			2	* D3189-1	CHAFING SHIELD
50	1	1		D3428-1	PLACARD

\*REFERENCE ONLY. PARTS ARE INCLUDED IN D212-664-141/-241 OR D412-664-243 ASSEMBLIES ABOVE  
NOTE: KITS INCLUDE EXTRA HARDWARE FOR COMPATIBILITY WITH BOTH DART AND BELL/AA  
SKIDTUBES.

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Revision: F  
Date: 08.09.05





# DART SERVICE INSTRUCTION

TO AMEND INSTALLATION INSTRUCTIONS IIN-D212-664 Rev. F AND  
INSTRUCTIONS FOR CONTINUOUS AIRWORTHINESS ICA-D212-664 Rev. G

REF. CANADIAN STC: SH01-9  
REF. FAA STC: SR01298NY  
REF. EASA STC: EASA.IM.R.S.01304

REFERENCE ONLY

For D212-664-101/-201 High Fwd/Aft Crosstube at CHG 004 or later, and D412-664-203 Aft Crosstubes at CHG 007 or later, an inspection window has been added on the underside of the crosstube to facilitate inspection.

**IMPORTANT NOTE:** If a D212-664-101/-201 or D412-664-203 Crosstube was stripped of paint, it should now be refinished as follows:

- 1) Apply chemical conversion film material (Alodine 1200 or 1201) per MIL-C-5541 and one coat of MIL-P-85582 or MIL-P-23377 primer.
- 2) Mask underside of crosstube as per hatched area shown in Figures 1 and 2 as applicable.
- 3) Paint outside surfaces of crosstube by applying 2-3 coats of MIL-C-85285 polyurethane paint to match original finish.
- 4) Apply clear coat on inspection window (hatched area).

Additionally, on D412-664-203 Aft Crosstubes at CHG 007 or later, the D2856-600-1009 Abrasion Strips have been removed, and D3189-1 Chafing Shields have been bonded onto the crosstubes using Proseal 890. For D412-664-203 Aft Crosstubes at CHG 007 or later, amend Parts List of IIN-D212-664 Section 5.1 and ICA-D212-664 Section 32.11.1 as follows:

Remove:

Item	QTY -203	Part Number	Description
31	2	* D2856-600-1009	ABRASION STRIP

If a D3189-1 Chafing Shield is being re-installed on the crosstube, it should now be re-installed as follows:

- 1) Follow section 32.1 of ICA-D212-664 for the removal of the crosstubes from the helicopter.
- 2) Remove the qty(2) MS21920-28 Clamps from the crosstube that fasten the D3189-1 Chafing Shields to the crosstube (ref. section 32.5 of ICA-D212-664).
- 3) Remove the D2856-600-1009 Abrasion Strip from the crosstube per section 32.7 of ICA-D212-664.
- 4) Inspect the crosstube surface where the chafing shields and abrasion strips were installed for corrosion and mechanical damage per items 5.3.1 and 5.3.2 of the 300 hour inspection. Repair damage within acceptable limits per item 5.3.3 of the 300 hour inspection. Touch up finish per item 5.3.9 of 300 hour inspection. If crosstube was stripped of paint, refer to instructions below for suitable refinishing of crosstube.
- 5) Apply a 0.02" to 0.04" (0.5-1.0 mm) thick layer of Proseal 890 on the concave surface of D3189-1 Chafing Shields and let cure per manufacturer's instructions.
- 6) Once the Proseal on the D3189-1 Chafing Shields is cured, apply a thin layer of Proseal 890 on the crosstube to cover the area where the Chafing Shields will be installed.
- 7) Locate the D3189-1 Chafing Shield as shown in Figure 3. Ensure that the overlapping edge of the chafing shield is located at approximately 60° from bottom vertical to prevent deterioration of the rubber bumpers. Be sure to eliminate any air gaps.
- 8) Position and tighten the clamps to a torque of 80-100 in-lb (9.0-11.3 N-m).
- 9) Allow the assembly to cure for 12 hours.
- 10) Re-install the D412-664-203 crosstube per section 32.2 of ICA-D212-664.

CANADA  
DEPARTMENT OF TRANSPORT  
AIRCRAFT CERTIFICATION  
BRANCH  
DAO # 01-0-01

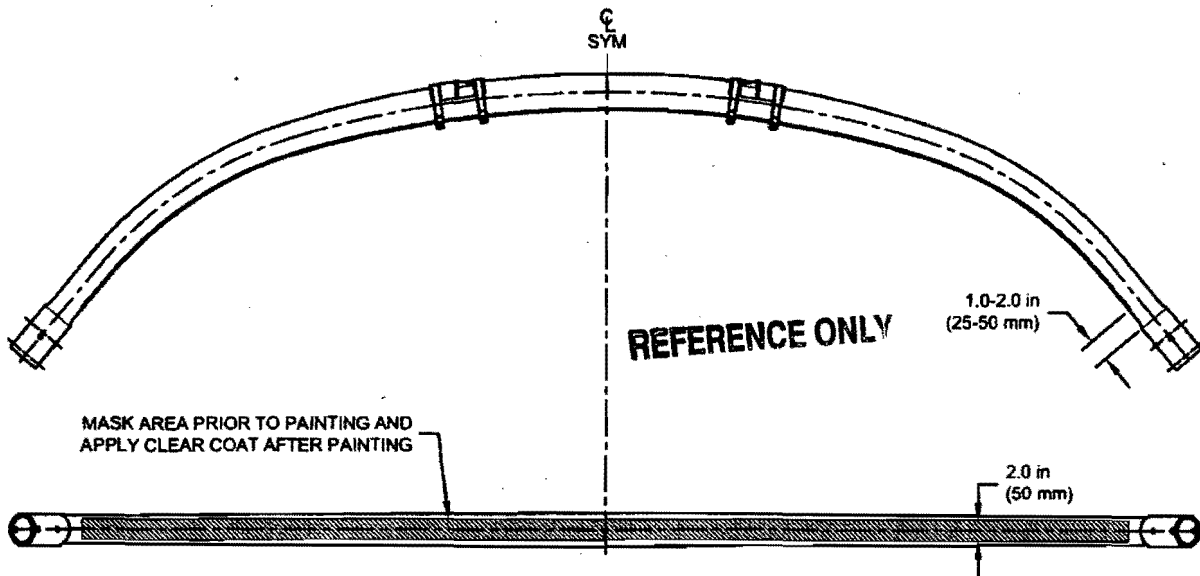
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BY:   
D. SHEPHERD (DE # 02)

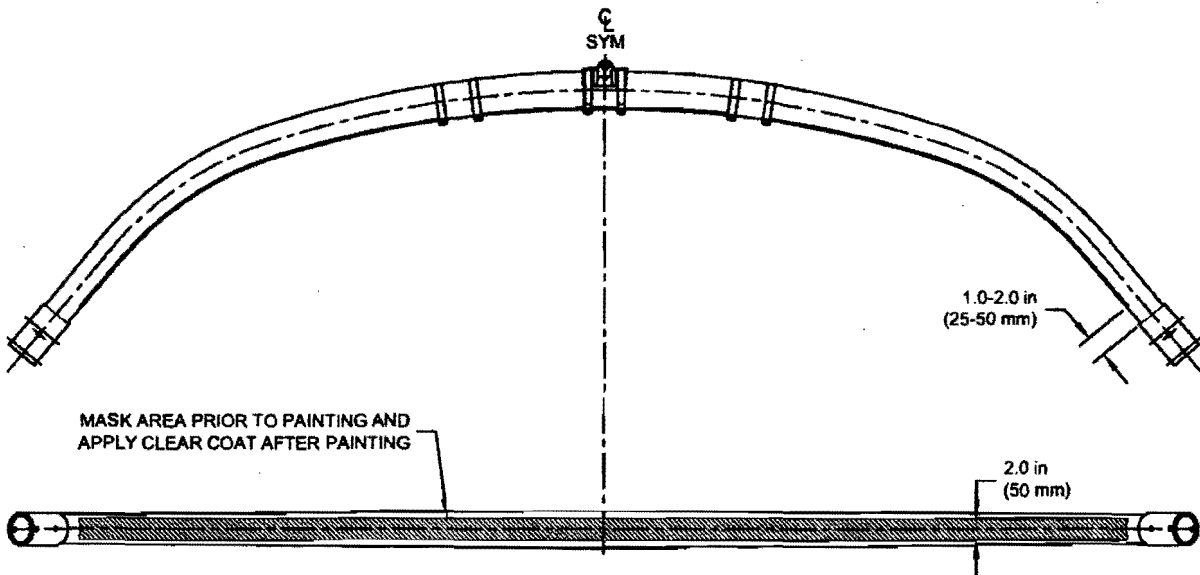
DATE: 11.04.01  
CERT. NO.: SH01-9  
ISSUE NO.: 3

A	NEW ISSUE	MB	11.04.01
REV.	DESCRIPTION	BY	DATE
DESIGN		<b>DART AEROSPACE LTD</b>	
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CHECKED		DRAWING NO.	REV. A
MFG. APPR.		DSI 9549	SHEET 1 OF 3
APPROVED		TITLE	SCALE
DE APPR.		D212-664 FINISHING CHANGE	NTS
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**FIGURE 1 - INSPECTION WINDOW ON  
D212-664-101/-201 CROSSTUBES**



**FIGURE 2 - INSPECTION WINDOW ON  
D412-664-203 CROSSTUBES**

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AIRCRAFT CERTIFICATION  
BRANCH  
DAO # 01-O-01

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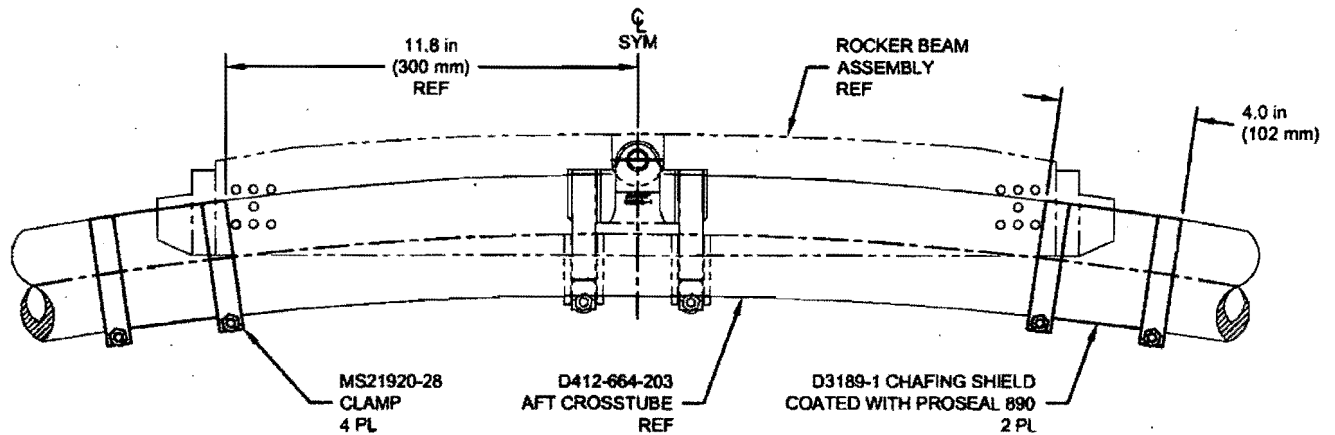
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MFG. APPR.	<i>[Signature]</i>	DSI 9549	SHEET 2 OF 3
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# REFERENCE ONLY



**FIGURE 3 - CHAFING SHIELD  
INSTALLATION ON D412-664-203**

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AIRCRAFT CERTIFICATION  
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MFG. APPR.	<i>[Signature]</i>	SHEET 3 OF 3	
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DRAWING NO. D212-664-141	TITLE XTUBE ASSY (205/212/412 HI FWD)	REV. D	<b>DART AEROSPACE LTD ENGINEERING ORDER</b>		D.E.O. NO. D212-664-141-D-1	SHEET NO. SHEET 1 OF 2	SCALE NTS
DRAWN		CHECKED	MFG. APPR.	APPROVED	DE APPR.		
DATE 11.04.07		DATE	DATE	DATE	DATE		

**PURPOSE:**

ADD AN INSPECTION WINDOW TO UNDERSIDE OF CROSSTUBE.

**CHANGE:**

**NOTES 2 OF SHEET 1 IS AMENDED AS FOLLOWS:**

**IS:**

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
MASK UNDERSIDE OF CROSSTUBE AS SHOWN (HATCHED AREA) AND  
PAINT OUTSIDE PER DART QSI 005 4.2  
REMOVE MASKING AND APPLY CLEAR COAT

**WAS:**

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2

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**PRELIMINARY ISSUE**  
11.04.16

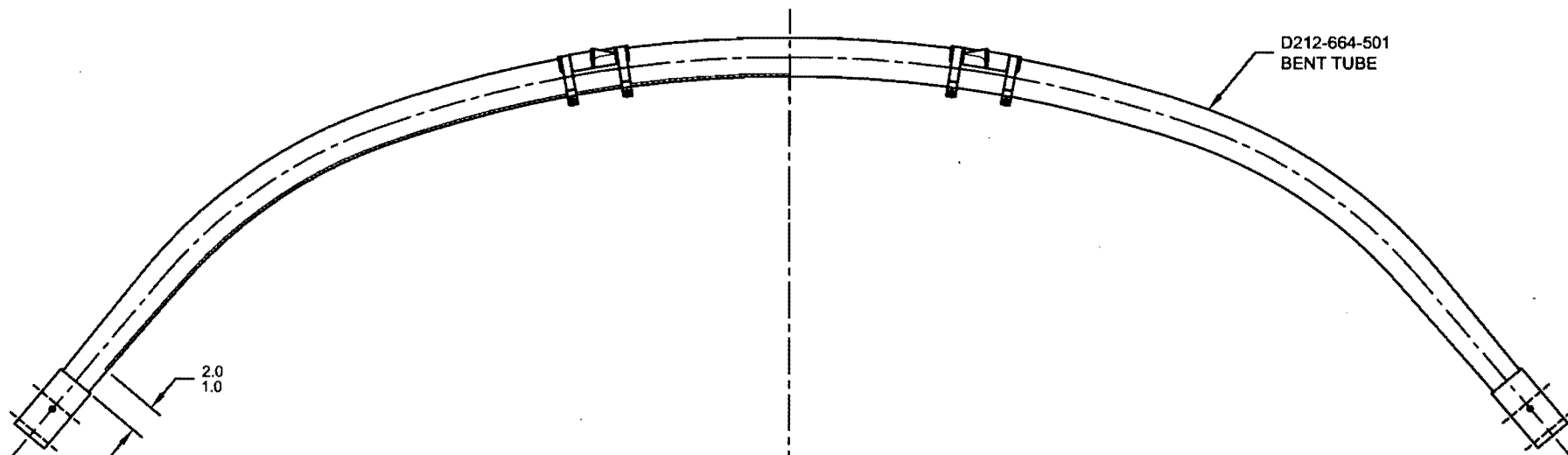




DRAWING NO. D212-664-141	TITLE XTUBE ASSY (205/212/412 HI FWD)	REV. D	<b>DART AEROSPACE LTD ENGINEERING ORDER</b>	D.E.O. NO. D212-664-141-D-1	SHEET NO. SHEET 2 OF 2	SCALE NTS
DRAWN	CHECKED	MFG. APPR.	APPROVED	DE APPR.		
DATE 11.04.07	DATE	DATE	DATE	DATE		

**IS:**

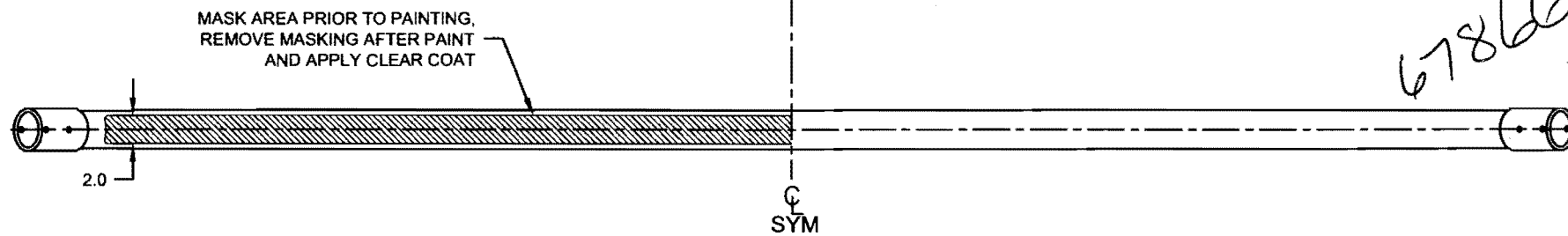
**WAS:**



**D212-664-141/-141B  
ASSEMBLY DETAIL**

**PRELIMINARY ISSUE**  
11.04.18

67866





8 7 6 5 4 3 2 1



Item	Qty -141	Qty -141B	Part Number	Description
1	X		D212-664-141	CROSSTUBE ASSEMBLY (205/212/412 HIGH FWD)
2		X	D212-664-141B	CROSSTUBE ASSEMBLY (214 HIGH FWD)
3	1	1	D6005-128	CROSSTUBE
4	2	2	D2893-1	SUPPORT
5	4	4	D3595-063-450	RUBBER CUSHION
6	4	4	MS21920-25	CLAMP (OR MS21920-26)
7	A/R	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

#### GENERAL NOTES:

- MATERIAL: MANUFACTURED FROM D6005-128  
FINISHED LENGTH = 126.514±0.020
- FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED
- UNITS: INCHES UNLESS OTHERWISE NOTED.
- BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- IDENTIFICATION: SCRIBE DART PART NUMBER "D212-664-XXX" AND BATCH NUMBER ON INSIDE OF CUFF  
USING VIBRATING STYLUS
- WEIGHT: D212-664-141 = 33.6 lbs (PER IIN-D212-664)  
D212-664-141B = 33.6 lbs (PER IIN-D212-664)
- PART IS SYMMETRIC ABOUT CENTERLINE.
- RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY. TRANSITION SHOULD BE SMOOTH.
- BEND PROGRESSIVELY WITH A MINIMUM OF 3 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 036.
- INSTALL D2893-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- INSTALL MS21920-25 CLAMPS (OR -26) WITH D3595-063-450 RUBBER CUSHIONS TO SECURE THE D2893-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
- EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

DEO ATTACHED

RELEASED  
2009-10-29

D	REFORMAT/REVISE GENERAL NOTES/PART LIST; REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS; ADD -141B (ZN B4-2, D4-2); REMOVED REF & ADD TOLERANCES (ZN B4-3, C6-3, C8-3 & B5-3); RELOCATED FLAG #6 PER PAR 08-046 (ZN A5-3); MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4	RF	09.09.30
C	REMOVE -851 ABRASION STRIP; ADD MAGNOBOND 6398, CUSHION, REVERSE CLAMPS	PH	07.03.08
B	ADD HOLES FOR COMPATIBILITY WITH BHT/AA SKIDTUBES	PH	05.02.04
A	NEW ISSUE	PH	00.12.12
REV.	DESCRIPTION	BY	DATE
DESIGN	PH	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	PH	DRAWING NO.	REV. D
MFG. APPR.	PH	D212-664-141	SHEET 1 OF 4
APPROVED	PH	TITLE	SCALE
DE APPR.	PH	XTUBE ASSY (205/212/412 HI FWD)	NTS
DATE	09.09.30	COPYRIGHT © 2000 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL, AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD	

8 7 6 5 4 3 2 1



8 7 6 5 4 3 2 1

D

C

B

A

12 13 15  
D2893-1 SUPPORT  
MS21920-25 CLAMP, 2X  
D3595-063-450 RUBBER CUSHION, 2X  
2 PL

A4-2

A

A

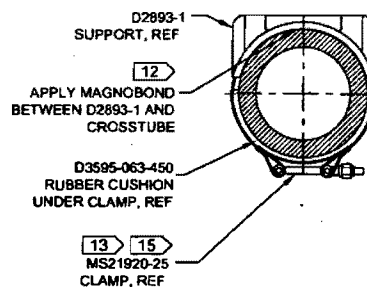
14.00 (-141)  
OR 13.75 (-141B)



D212-664-501  
BENT TUBE

SYM

**D212-664-141/-141B**  
**ASSEMBLY DETAIL**



**SECTION A-A** D5-2  
SCALE 4X

DEO ATTACHED

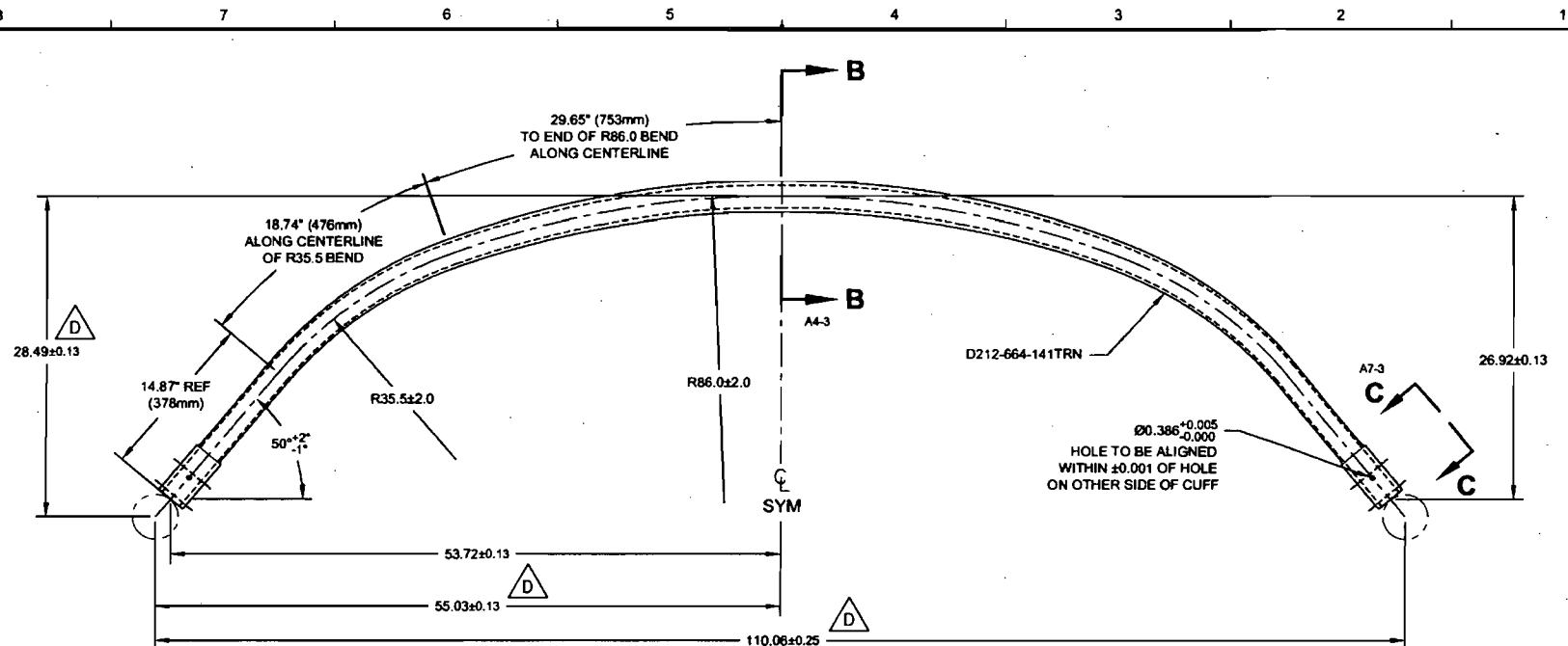
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2009-10-29

67866

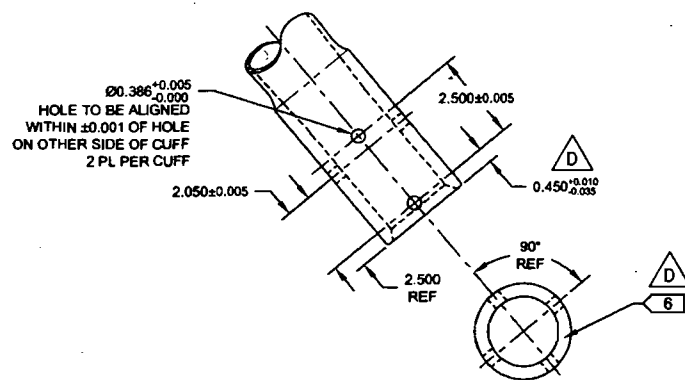
DESIGN	PH	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	P	DRAWING NO.	REV. D
MFG. APPR.	AS	D212-664-141	SHEET 2 OF 4
APPROVED	12	TITLE	SCALE
DE APPR.	12	XTUBE ASSY (205/212/412 HI FWD)	NTS
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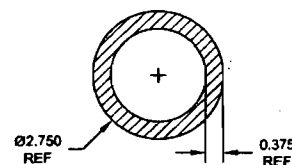




**D212-664-501**  
**BENDING AND DRILLING DETAIL** 10 D



**VIEW C-C: CUFF DETAIL** C2-3  
SCALE 3X



**SECTION B-B** C4-3  
SCALE 4X

DESIGN	PH	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	P	DRAWING NO.	REV. D
MFG. APPR.	AP	D212-664-141	SHEET 3 OF 4
APPROVED	AP	TITLE	SCALE
DE APPR.	AP	XTUBE ASS'Y (205/212/412 HI FWD)	NTS
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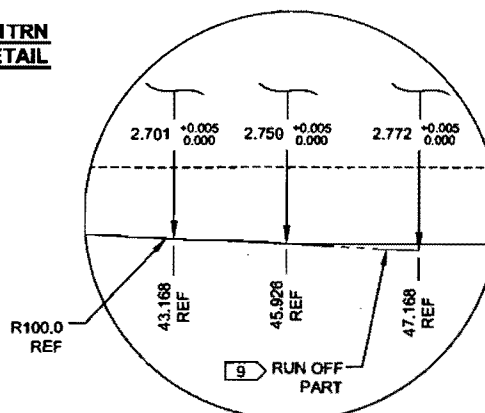
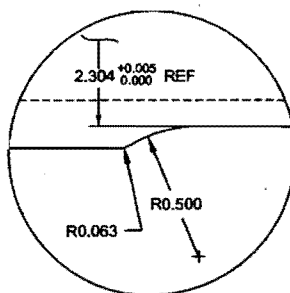
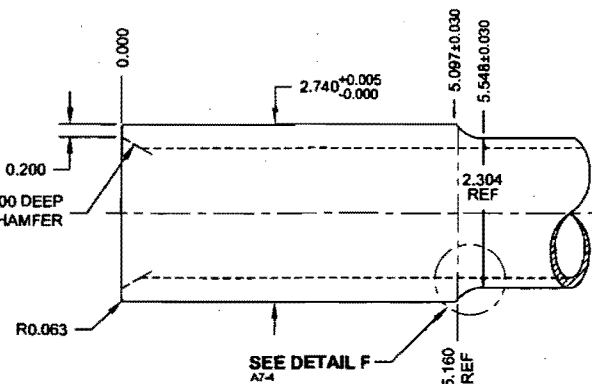
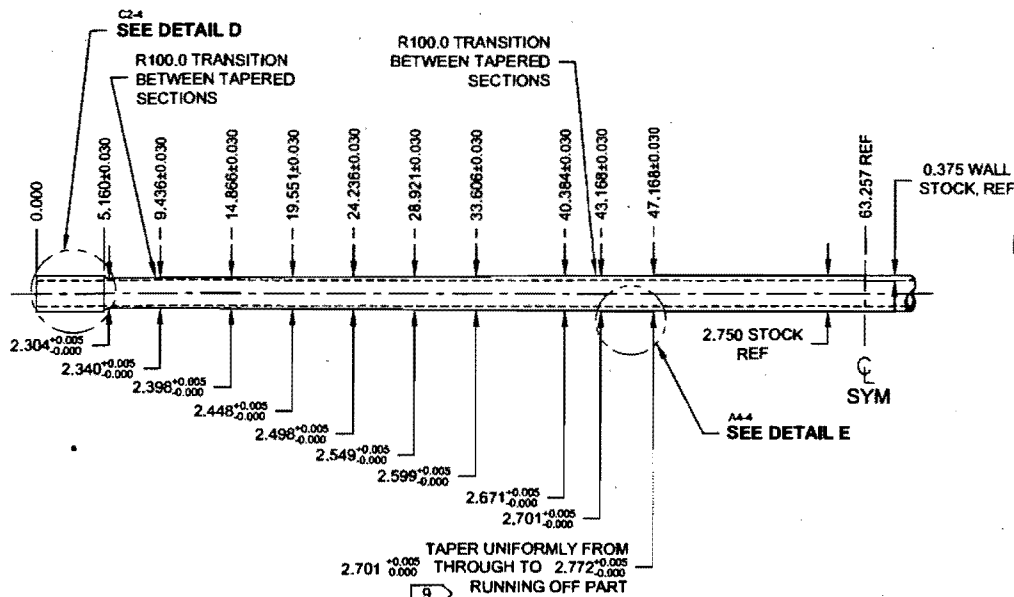
DEO ATTACHED

RELEASED  
2009-10-29

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**D212-664-141TRN**  
**TURNING DETAIL**

67866

DEO ATTACHED

**RELEASED**  
2009-10-29

DESIGN	PH	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	JP	DRAWING NO.	REV. D
MFG. APPR.	IS	D212-664-141	SHEET 4 OF 4
APPROVED	AP	TITLE	SCALE
DE APPR.	TH	XTUBE ASS'Y (205/212/412 HI FWD)	NTS
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DRAWING NO. D212-664-141	TITLE XTUBE ASSY (205/212/412 HI FWD)	REV. D	DART AEROSPACE LTD ENGINEERING ORDER		D.E.O. NO. D212-664-141-D-1	SHEET NO. SHEET 1 OF 2	SCALE NTS
DRAWN	CHECKED <i>OP</i>	MFG. APPR. <i>B</i>	APPROVED <i>MP</i>	DE APPR. <i>MP</i>			
DATE 11.04.07	DATE 11.07.11	DATE 11.04.12	DATE 11/04/12	DATE 11.04.12			

**PURPOSE:**

ADD AN INSPECTION WINDOW TO UNDERSIDE OF CROSSTUBE.

**CHANGE:**

NOTES 2 OF SHEET 1 IS AMENDED AS FOLLOWS:

**IS:**

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
MASK UNDERSIDE OF CROSSTUBE AS SHOWN (HATCHED AREA) AND  
PAINT OUTSIDE PER DART QSI 005 4.2  
REMOVE MASKING AND APPLY CLEAR COAT

**WAS:**

- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2

**RELEASED**  
2011-04-18

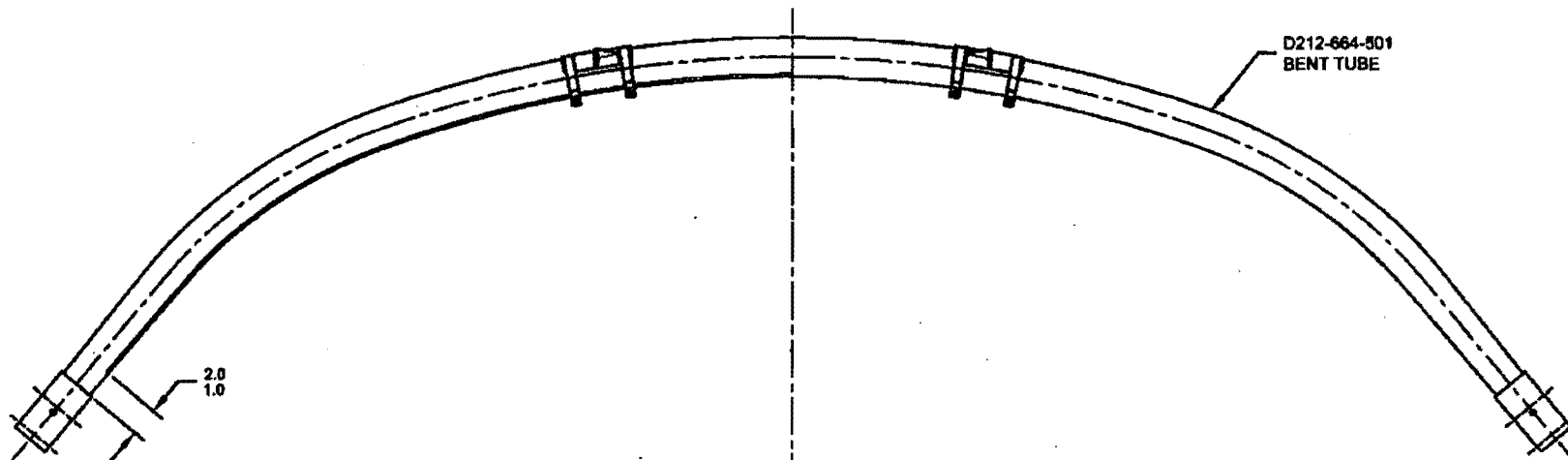
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DRAWING NO. D212-664-141	TITLE XTUBE ASSY (205/212/412 HI FWD)	REV. D	<b>DART AEROSPACE LTD ENGINEERING ORDER</b>	D.E.O. NO. D212-664-141-D-1	SHEET NO. SHEET 2 OF 2	SCALE NTS
DRAWN	CHECKED	MFG. APPR.	APPROVED	DE APPR.		
DATE 11.04.07	DATE 11.04.11	DATE 11.04.12	DATE 11/04/12	DATE 11.04.12		

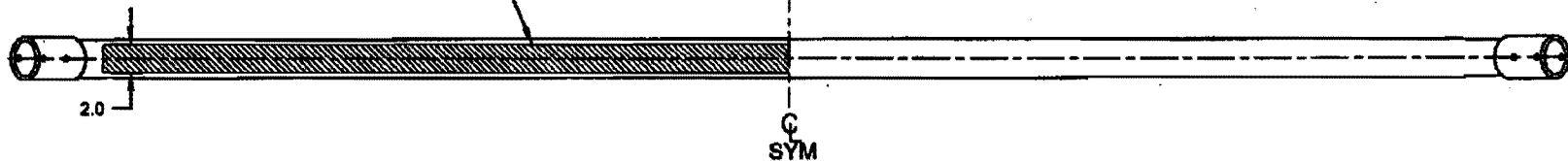
IS:

WAS:



**D212-664-141/-141B  
ASSEMBLY DETAIL**

MASK AREA PRIOR TO PAINTING,  
REMOVE MASKING AFTER PAINT  
AND APPLY CLEAR COAT



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